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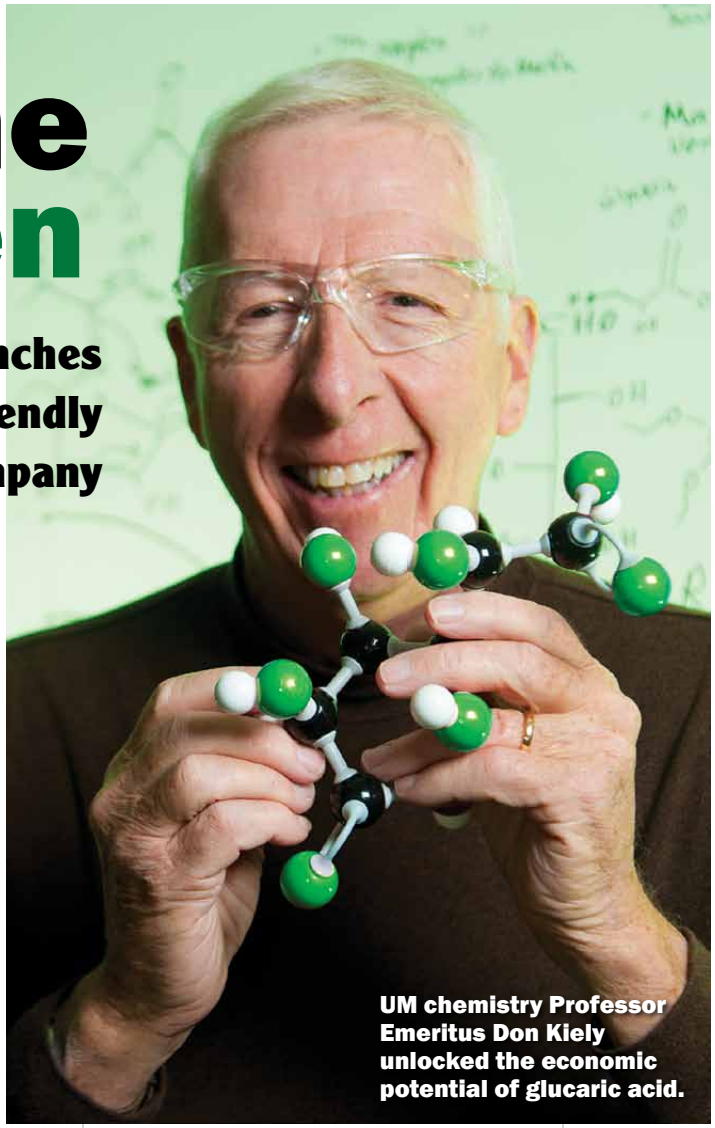
Gone Green

UM research launches environmentally friendly chemical company

Everyone likes good chemistry. Take the sizzling kind between two people in love, or the brainstorming among co-workers that generates brilliant ideas. When it comes to Rivertop Renewables, the hottest sustainable startup business coming out of Missoula, good chemistry is the key to success.



UM chemistry Professor Emeritus Don Kiely unlocked the economic potential of glucaric acid.

Start with pragmatic chemist and inventor Don Kiely, who retired from The University of Montana in 2008. Add a team of Ph.D. chemists with strong ties to Missoula and Kiely's work. To run the new company, invite a motivated community organizer, who happens to be Kiely's son, Jason. Find a talented company president specializing in startup companies. Mix in high-level support from UM, the Missoula business community and U.S. Sen. Max Baucus, who played a key role in securing millions in financing for the new company to grow in Missoula.

The result? Rivertop Renewables is on its way to becoming a globally significant force making clean, green chemicals to replace phosphates that pollute waterways and petrochemicals that show up in everything from plastics, paints and flooring to aspirin, clothing and electronics.

Within the next year consumers will start reaping the rewards of the new progressive technology in sparkling clean glassware and effective de-icers on roads. The secret lies in the wondrous properties of glucaric acid and its related polymers, both made from glucose, one of the most available and environmentally benign resources around. Corn is the No. 1 glucose source in the U.S.

The reason Rivertop is on a fast track to commercial success stems from Kiely's patented oxidation technique to make glucaric acid that is efficient, inexpensive and wastes nothing. Glucaric acid is listed by the U.S. Department of Energy as one of the top 12 chemicals of the future made from renewable resources.

"If you're going to do something on a large scale, you want to find a material that's the cheapest, the most available and a resource you can count on," says Kiely, who at age 74 is lean and lanky, with a friendly demeanor and the patience to explain complex chemistry to the layperson. When he tells the story of the research leading to Rivertop, it's clear he has long been a chemist ahead of his time. Kiely saw the flaw in traditional chemistry that makes long-lasting chemicals, allowing tennis shoes to sit 600 years in a landfill before decomposing. He focused instead on short-lived chemicals that would be renewable, biodegradable and harmless in watersheds and soils.

For Joe Fanguy, director of UM's Office of Technology Transfer, the big news is that University research has led straight to high-paying jobs in Missoula. And those jobs are in a company that's offering sustainable solutions to worldwide problems. Today, Rivertop Renewables

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Rivertop — continued from front

has 16 mostly local employees. That should double over the next two years and continue to rise.

"The economic development piece excites me the most," Fanguy says. "The general taxpayer wants to know, where is my payback on research?"

Each year, UM brings in about $70 million in research funding, with about $50 million coming from federal sources. When research leads to a new business with growth potential in Missoula, the payback is clear, Fanguy says. UM stands to gain, too, both from the royalties it will receive as the company turns a profit and in the educational opportunities for students who can serve as interns and be part of something big.

"Rivertop is a wonderful example of a company built upon the transfer of ideas from a University laboratory to the private sector," says UM President Royce Engstrom, who happens to hold a doctorate in chemistry. "This is exactly the kind of business development and job creation we need in Montana."

In spring 2011 the then-3-year-old company attracted a U.S. Economic Development Administration grant awarded to the Montana Technology Enterprise Center (MonTEC), which houses Rivertop and several other startup businesses. Former Missoula Mayor Mike Kadas and Baucus stepped up to help secure the grant. The University committed $1.75 million as a required match to tally $3.5 million.

The grant funds the expansion of MonTEC as a semi-works facility for Rivertop to produce glucaric acid, as well as advancing its related polymer technology. The company will contribute up to $2.5 million in private funds to equip the facility.

The grant is a win-win result for UM, Fanguy says. "Rivertop needed to grow, and MonTEC needed a new business plan."

In November, Rivertop also secured a $1.5 million investment from Cultivian Ventures, an Indiana-based venture capital fund focused on technology opportunities in food and agriculture. Cultivian co-founder Ron Meeusen has joined the Rivertop board, bringing 30 years of experience in taking new technologies and products to market.

Behind the capital improvements and the hoopla over new jobs lies that good chemistry – from the sustainable solution to the people who are taking it forward. The story begins with Don Kiely's arrival at UM in 1997, after 29 years as a professor at the University of Alabama in Birmingham, where he specialized in carbohydrate chemistry.

Kiely attracted several doctoral students, including Tyler Smith, who today directs research and development for Rivertop Renewables. Smith points out that many chemistry graduate programs are theoretical or dedicated to pharmaceutical drugs, a field that didn't interest him.

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>
> **— Royce Engstrom**
> **UM President**

"I was drawn to Don's research by the real pragmatism," Smith says. "He wanted to make commercially relevant and environmentally friendly products that could turn into a business."

As director of UM's Shafizadeh Rocky Mountain Center for Wood and Carbohydrate Chemistry, Kiely was able to take the pivotal step in his research using simple sugars and converting them into their diacids, particularly glucaric acid. Chemists have known how to make glucaric acid from glucose using a nitric acid process since the late 1880s.

"The patent literature for glucaric acid gives you a sense of the potential," Kiely says. "There are hundreds of variations, but they were never realized on a commercial scale."

Kiely wanted to invent a new process for making glucaric acid that would take the genius substance off the shelves of academia and into the marketplace. As far as patents, he's got 12 of his own.

The question that guided his UM work was this: "Could I delve into the oxidation technology and design a process that would be transferable to a commercial scale?" He pursued the answer and attracted funding, University support and excellent graduate students.

And he solved the problem.

The old way of making glucaric acid was both wasteful and expensive. For every 100 pounds of glucose, only 59 pounds of glucaric acid resulted. To produce it took large quantities of nitric acid, with very little recycling.

"Now, we're putting oxygen into the process," Smith explains. "We regenerate our nitric acid as it is being consumed in the same pot as the oxidation. We are left with a product mixture that is glucaric acid and the nitric acid we started with. We have a process to remove the nitric acid and use it again."

Instead of 59 pounds of product, they can generate 144, starting with just 100 pounds of glucose. Kiely patented the process and a second related effort in polymer technology.

Glucaric acid is the starting material to create new polymers (large molecules with repeating structures) with various combinations of A molecules connecting to B molecules.

"When you have four or five of the A component and a dozen of the B component, you can mix them into any combination that you want in effect," Kiely says.

The key green quality is that the glucaric acid segments come from sugar, so they help the polymers biodegrade in the environment. Those polymers have promising applications for short-life applications that replace petrochemicals, from better adhesives and absorbents to fertilizer delivery agents.

After UM patented the oxidation and polymer processes, it was time to license the technology. That's where UM's Office of Technology Transfer has played a vital role, starting with Fanguy's predecessor Tony Rudbach, who suggested Kiely start a company.

"My intention was to retire at 70, not start a company," Kiely says, "but there wasn't a choice. So we came with the platform and the platform technologists. If they hadn't come we could never have done it. We all had the same vision."

So much has happened that Kiely says it feels like 20 years, not four. His son Jason was soon joined by businessman Jere Kolstad, who became the president and CFO. Kolstad came to Missoula via Seattle, but hails from Glasgow.

"I'm a startup guy," says Kolstad, a large garrulous man with a ready laugh and a barrel full of enthusiasm. "It's really rare to see the kind of potential this company has, and that's why we are attracting venture capital."

He points out that industrial companies won't pay more for green products, so the key is to be competitive.

"If you get the same performance at the same cost, the tie will go to the green product," Kolstad says. "We have to win the cost battle and we are there."

It's also rare to see how fast the product is going to market. Kolstad expects Missoulians will benefit from the product next year every time they twirl a wine glass between their fingers at a restaurant or pick up a shiny plate in the University cafeteria.

Detergents likely will be the first major application of glucaric acid as a replacement for phosphates. The target market will be automatic dishwasher detergents for consumers – a multimillion dollar industry.

The timing couldn't be better. Phosphates now are banned from dishwasher detergents, and for the past year companies have scrambled to find an affordable substitute that will work as well. Until now, they have failed.

Glucaric acid is the ideal cleaning agent, Smith explains. It serves as a builder that captures magnesium and calcium found in hard water and then prevents them from forming soap scum.

"We spend a lot of our research time washing dishes," Smith says with a grin. The laboratory has three dishwashers that test various levels of hard water and how well the glucaric acid performs.

The other key market for Rivertop is in the field of corrosion inhibitors. That may sound less jazzy to consumers, but not when you consider that one application is in de-icing – whether at the level of highway departments salting roads or residents salting their sidewalks.

Salt melts ice, but it rusts vehicles and bridges. To combat that problem, industries have switched from rock salt to a brine solution combined with a corrosion inhibitor. The problem lies in the inconsistency and handling expense of corrosion inhibitors available today. Now the company has contracted with the Montana Department of Transportation to supply 110,000 gallons of a bio-based corrosion inhibitor.

Rivertop, once again, is showing its product works efficiently, cheaply and without any negative impact on the environment. And that's the beauty. The results come from a process that's straightforward, relies on one of the most common substances around (glucose) and can be produced on a large scale. It sounds easy, but the success today is a result of countless hours in the laboratory.

"The most challenging research you can do is to make something as simple as possible," Smith says.

That might serve as a good reminder for anyone in search of that elusive "good chemistry."

— By Deborah Richie

Jason Kiely of Rivertop Renewables looks over the blueprints for a MonTEC business incubator renovation and expansion project, which is under way.

Business Booster

MonTEC celebrates decade of incubating new companies

At first blush the Montana Technology Enterprise Center (MonTEC), a 32,000-square-foot building situated across the river from the UM campus, seems like any other business warehouse. But MonTEC isn't out to do business per se: Its goal is to help other businesses thrive in a world where startup companies sink more often than swim.

The multitenant business incubator represents a wide range of businesses, each with its own projects, ideas and personality. The eclectic mix provides a dynamic that average single corporations might not have. One room, for instance, is covered in computer-related posters and houses computer programmers working on software. In another room decorated with periodic tables, scientists look at water samples under microscopes.

"You really do have a lot of uniqueness from company to company," says Joe Fanguy, UM director of technology transfer and current MonTEC president. "If you go into IBM or Google, there's a certain degree of continuity. Here, each of the respective office spaces or laboratories has their own characteristics. They're all doing something different."

Since its inception 10 years ago, the nonprofit business incubator has housed fledgling companies, providing them with resources and support. And up until fall 2011, MonTEC was operated by the now-dissolved Missoula Area Economic Development Corporation. UM now manages the incubator and has a new five-member board in place with representation from UM, Missoula County and the Missoula Economic Partnership.

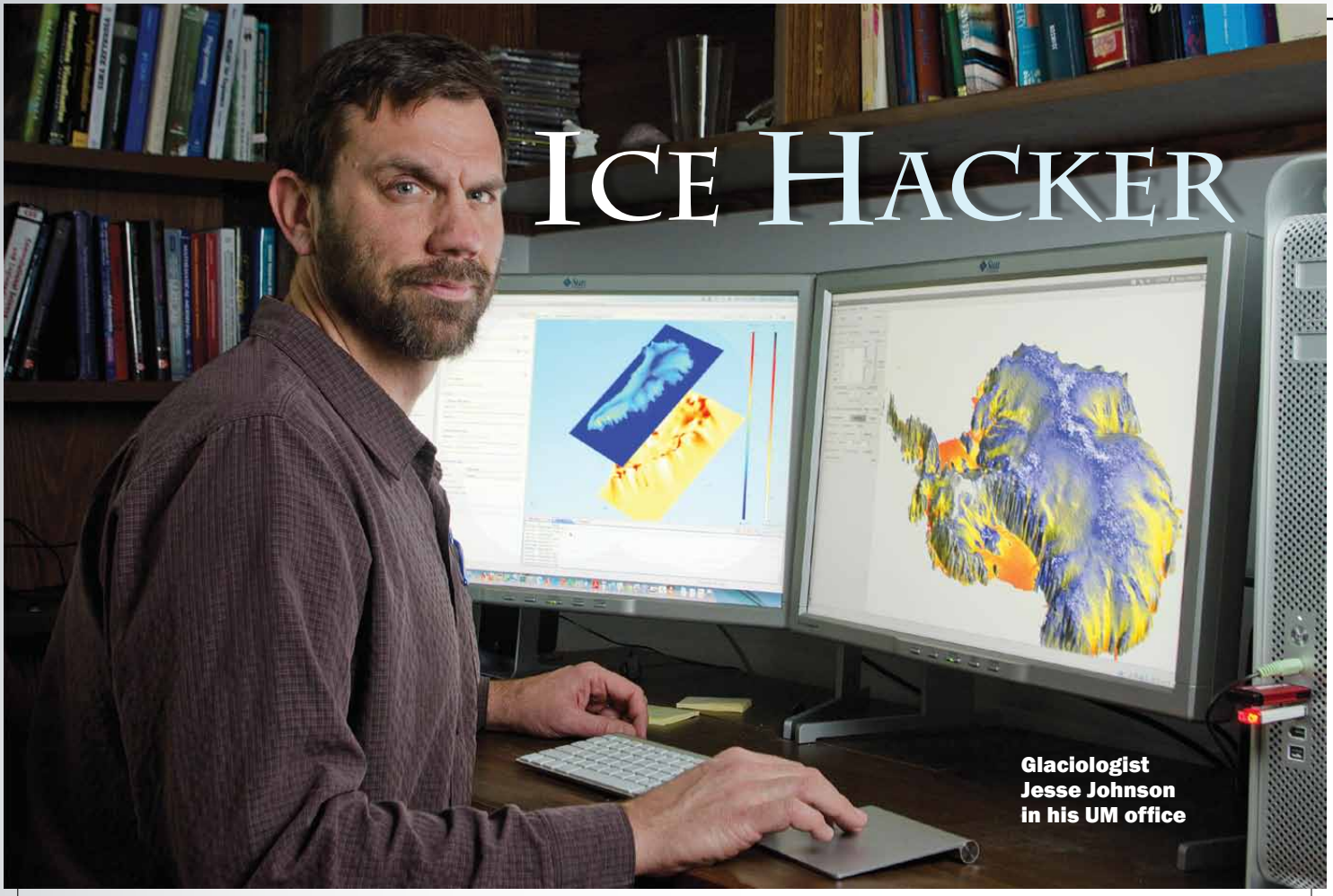
Fanguy, who holds a biophysical chemistry doctorate from Mississippi State University, was hired two years ago to lead UM's technology transfer efforts. He is one of three UM administrators now serving on the MonTEC board. Fanguy also helps identify companies that would benefit from the incubator.

Fanguy intends that MonTEC's fresh start will make it an even more effective business space for the University and future startups.

UM does about $65 million to $70 million of research a year. That's enough to result in a range of new ideas for market products. In the science departments, professors and students work on technologies that often lead to intellectual properties and commercial

MonTEC — continued back page

Ice Hacker



Glaciologist Jesse Johnson in his UM office

Researcher works to improve models of glacier movement

Though outwardly fit, UM ice-sheet modeler Jesse Johnson describes himself as "the fat slob of glaciology."

That's because the associate professor of computer science contends glaciologists are generally superior athletes. A Dutch scientist he collaborates with, for example, was the first person to ski across Greenland and later skied to Antarctica's South Pole. Another partner from Alaska recently received the Piolet d'Or (Golden Ice Axe), a coveted French mountaineering award. Even Johnson's closest research partner at UM, Joel Harper, lives for weeks at a time on glaciers and has kite skied on Greenland's ice cap.

"These are hyper-fit people," Johnson says. "I think a lot of glaciologists get into the field so they can do mountaineering all the time. That's not me. I'm more of a computer jockey. I interpret the data and try to improve our models of ice movement."

Such improved models are key to helping humanity understand the potential perils presented by climate change, melting ice and sea-level rise. But as a guy who makes models, Johnson believes the public should be more skeptical about their power.

"Models help us understand how processes work, and that's a good thing," he says. "Unfortunately, policymakers and social pressures push us into situations where we try using our models to predict the future. To be honest with you, if I could predict the future, I wouldn't be modeling ice sheets – I would be on Wall Street getting rich."

Johnson came to UM in 2002 after a Peace Corps stint in Africa and then earning a computer science master's degree and physics doctorate at the University of Maine. In Maine he worked at the university's Climate Change Institute and was mentored by prominent ice-sheet researchers James Fastook and Terrence Hughes, who created large-scale models applicable to Greenland, Antarctica and past ice ages.

At UM, Johnson launched his own research program investigating ice movement. He says ice behaves much like a fluid during long timescales – not water, but liquids such as ketchup, paint or blood.

"These nonlinear fluids are weird," he says. "Take ketchup for example. It forms a little dome on your plate that doesn't really move around. But to get it on your plate, you had to put enough stress on it – by squeezing the bottle – to make it gush out. And that's similar to how ice behaves – fluid-like under larger shear stress; solid-like under lower stresses. It's called shear thinning."

Last year Johnson worked at a South African mathematical institute studying the attributes of blood. "Ice is more like blood than water, so I was able to learn

a lot of new tricks about how to deal with the nonlinearities in the viscosity of ice," he says. "South Africans don't know much about ice, but they know a lot about blood. That's where the first artificial heart was installed."

Johnson says he actually peer-reviewed one of Harper's papers before they knew they were on the same campus. The two realized they have similar interests and have been close collaborators since 2004, garnering millions in grants from the National Science Foundation, NASA and even foreign countries.

"I think our work complements one another well," Johnson says. "I'm strong on the computational side, and he's very strong at thinking in terms of processes and going out into the field and getting the real-world measurements. I will formulate a model, which I'm quite confident is bad in many ways, and when the model fails to explain what Joel measures, we will change the model so that his measurements are reproduced. That's how we improve the model."

Harper says Johnson's abilities as a modeler have been invaluable.

"I am quite fortunate to have a collaborator who can always bring to the table the most cutting-edge numerical tools and techniques – along with good creative thinking," Harper says. "Jesse is a major player in the international ice-sheet modeling community, and many researchers seek to get him involved in their work. I'm lucky to have the advantage of being on the same campus."

Johnson spends much of his time writing programs that access computer libraries developed by national laboratories to compute the state of ice sheets. He uses these libraries, which basically do math, to do the computations he needs for comparing Harper's data to model output.

"With my background I have an easier time on the programming side, but then there is this deep mathematical side I struggle to understand," Johnson says. "I think many good scientists would tell you the same thing: You can never know enough math."

Johnson says scientists make extremely accurate measurements of ice velocity on the surface, but they know little of what happens deep within ice sheets – especially when they are kilometers thick. Harper has drilled into the ice to place sensors deep inside, and this has led to some interesting revelations.

"Conventional wisdom is that the fast motion you witness on top is due to sliding on the bottom, but our newer datasets suggest there is more deformation in the ice than we thought," Johnson says. "The top ice moves faster, so it's similar to a deck of cards being spread out by a dealer. Our models will need to be changed in fairly significant ways to accommodate the amount of deformation that we are seeing."

He says the Harper data also reveal more water coming and going beneath the ice than suspected. The data reveal fluctuations that often change on a daily basis, and these changes occur on smaller scales and in shorter time frames than expected.

"In some ways the new data just presents more problems for our models, but I think these are the types of problems that make life fun," Johnson says. "What would we do if we had everything figured out?"

For one of their more interesting projects, Johnson and Harper received a $1.08 million NASA grant to support Operation IceBridge, a space agency effort to use lasers aboard airplanes to map the density of the Greenland ice cap. The project will continue until a next-generation mapping satellite, ICESat-2, launches in a few years.

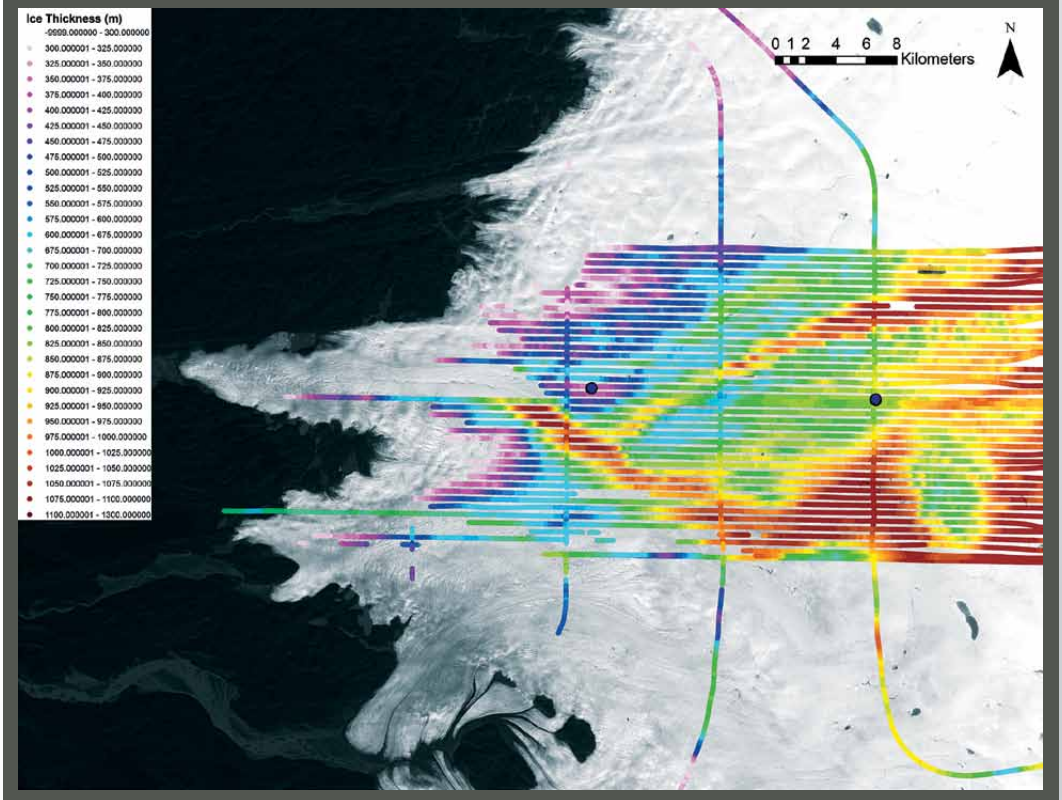
Johnson says they are part of a team that helps determine where the DC8 flights for IceBridge are flown.

"You can't fly the planes everywhere, but how big of an error do you introduce by not flying everywhere?" Johnson asks. "So we take the surface and bed data that is gathered, and we put it into our models. If the models start failing – there is somehow more or less ice than expected – then we infer that the flights aren't being done correctly and we advise flying more lines in certain areas."

Though Johnson generally prefers the office for his glaciology work, his research has whisked him around the globe to interact with other modeling experts. He has fond memories of exploring Storglaciären, Sweden's largest glacier, and of observing penguins in Antarctic cold from the deck of a ship – clad only in shorts after an extended sauna.

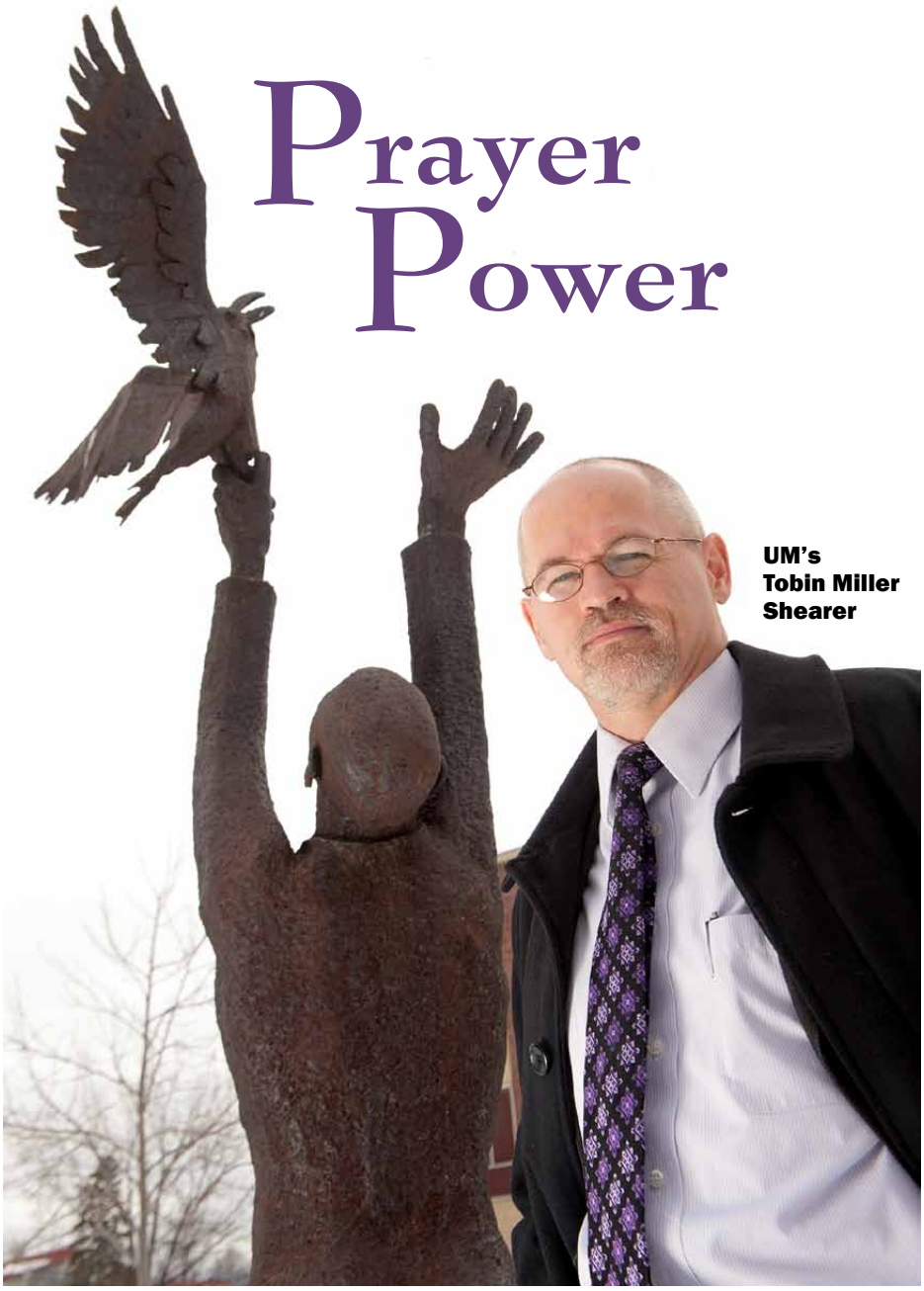
"This work has given me a front-row seat to some really fascinating things that are going on," he says. "I think that alone makes it worthwhile, and if I can contribute in some modest ways with my science, so much the better."

— By Cary Shimek



This image reveals the thickness of a portion of Greenland's ice sheet. It was produced from data obtained by Operation IceBridge, a NASA effort using lasers aboard airplanes to map the density of Greenland ice. (Image by UM doctoral candidate Toby Meierbachtol)

Prayer Power



UM's Tobin Miller Shearer

Historian researches unique aspect of civil rights movement

Pick two words with the potential to be highly flammable when placed together, and you have the primary research topic for the director of UM's African-American Studies Program. Tobin Miller Shearer studies the history of race and religion. He's particularly focused on where the two ignite to create positive change.

Perhaps the most provocative subject is his latest line of research – public prayer as an agent of progress during the civil rights movement of the 1950s and '60s.

"My contention is that prayer was the most potent religious resource activists used to create crisis in their civil rights' actions," Shearer says. "Without prayer-invoked tension, the U.S. may not have seen major breakthroughs such as passage of the 1965 Voting Rights Act."

So far, his research delivers plenty of evidence to support his theory.

Shearer, who sports a dapper beard, round glasses and the lean build of a runner, is steeped in the history of the civil rights movement. Like all historians, he delights in reading voluminous books and sorting through mounds of articles, first- and second-person accounts, and video footage. He can recite dialogues from memory and vividly conveys riveting dramas such as this one:

Step back to the year 1965. Martin Luther King Jr. sent his friend and fellow civil rights leader C.T. Vivian to the racist stronghold of Selma, Ala. The situation looked ominous. Despite a judge's injunction to prevent disturbance of voter registration, the orders were ignored.

In a show of solidarity, a large group of African-Americans gathered on the steps of the county courthouse, where they planned to register to vote. At the top of the steps blocking their way stood the heavyset Sheriff Jim Clark, notorious for his vicious temper and use of Ku Klux Klan members as irregular deputies.

Vivian, at the head of the crowd, walked up the steps to face Clark in a classic standoff. What happened next altered the tenor of the scene. Vivian turned to the crowd behind him and led them in prayer, with phrases such as these, as Shearer recalls:

"Shall we stand in prayer [before] ... this sheriff breaking Judge Thomas' order? We ask, O Lord, your blessings upon us and your safekeeping of us as we go into jails that have misused us, as we go into jails where men have been beaten, where the waters have been placed upon floors, where there has been no heat. Keep us, Lord, as we go, keep us from illness, keep us from the brutality of this official."

In a famous news photo, Clark holds up his watch to Vivian with a glare and clear meaning – your time is up. The prayers continued until the protesters calmly walked inside and were arrested.

The next week, Vivian returned to the courthouse steps again in a repeat confrontation. As before, news photographers and TV stations gathered. The mood was tense.

This time, Clark allowed no time for prayer. He struck Vivian in the face so hard he broke his hand. Cameras clicked and video cameras whirred. Within hours the nation, including President Lyndon B. Johnson, watched the atrocity on the news. Shearer believes that Vivian's forceful prayer earlier had instigated Clark's rage.

The violence worsened on March 7, a day infamously known as Bloody Sunday, when Sheriff Clark ordered blue-helmeted police to bludgeon a crowd of civil rights marchers who had just finished praying. By the end of summer, the president signed the Voting Rights Act.

"How does change happen?" asks Shearer. "That's the larger question I'm working on."

Shearer's passion for the subject comes from many years in the trenches working to end racism and his own

Shearer is shown on campus with "Noah Releasing the Raven" by sculptor George Wallace

religious background as a Mennonite, a denomination known as one of the peace churches, along with the Church of the Brethren and the Religious Society of Friends (Quakers).

Shearer worked for the Mennonite Central Committee in New Orleans for six years, assisting the families of homicide victims and administering other social service projects. He co-founded a national anti-racism training committee of the Mennonites called Damascus Road in 1995. In Shearer's nine-year tenure there, he led more than 450 workshops and seminars. The trainings continue today.

"I often lectured on college campuses and came to realize that's where I wanted to be," he says. After earning a doctorate at Northwestern University in history and religious studies, UM's history department hired him for his first professorship four years ago.

Shearer's extensive background with Mennonites led to the subject of his other main research area, where progress to end racism took place in the intimacy of homes. He's completing a book examining the role of African-American children in changing their hosts' perceptions of race as a result of spending one to two weeks living with white families. The book spans the era from the 1940s through the 1970s of the still ongoing Fresh Air rural hosting programs.

His new research endeavor on public prayer in the civil rights era is one more step in Shearer's quest to understand the nature of societal change.

A leading social change theorist, James Davison Hunter, argues that long-term social change comes from the leaders and the elites at the top of the movement. But Shearer's findings suggest the opposite – that social change in the civil rights era came from the grassroots.

He deliberately has cast his net wide to look at lesser-known activists and to prayer events without specific leaders, such as "kneel-ins" within segregated churches.

He describes another spontaneous use of prayer with powerful effect in a small rural town in the South, where people knew everyone by name. One night at the close of service at a segregated African-American church, the congregation headed outside to find themselves encircled by the Ku Klux Klan. Their reaction was to pray for them out loud and by name. The KKK local residents were shamed into slinking away into the dark.

What is this crisis that prayer triggers? Shearer explains that the crisis often becomes a moral one for those about to harm the people who are praying.

"We recognize someone praying instantly," he says. The actions of kneeling, clasping two hands together or bowing of a head are almost universally honored. Prayer is a holy stance. Violating praying people is likewise almost universally condemned.

Did the leaders of the Bloody Sunday peaceful protests and other actions plan to use prayer to arouse public outrage? Shearer hasn't found proof of prayer as a thought-out strategy.

"Those leaders who prayed were very astute and acted with clear intention in public, but prayer to them was also as natural as breathing," he says.

Take Fannie Lou Hamer, a civil rights activist who suffered greatly in her courageous path. She grew up and worked on a Montgomery, Miss., plantation and as a young adult was sterilized without her knowledge. When Hamer attempted to register to vote she was fired from her job on the plantation. She turned to organizing registration drives. In 1964, Hamer was beaten almost to death in a Mississippi jail. Her public orations were known for her spontaneously breaking into song, belting out "Go Tell it on the Mountain" and other religious hymns that also served as change-creating public prayer.

Not all prayers have a crisis-inducing impact, Shearer points out. Public prayer in the civil rights movement appeared in four ways, with only the fourth playing a definitive role.

The first is mediated prayer, where an object or physical substance is used to exercise the experience of the divine, he explains, such as rosaries or Buddhist prayer flags. The second is conversant prayer, when a leader has a direct line to a deity. (Televangelists are good examples.) The third is scripted prayer, when a group recites a written prayer.

The fourth is performative prayer that takes place in front of an audience and refers to events and people in the moment. Throughout are stock phrases serving as cues that a prayer has begun, such as "Dear Lord" or "Our Heavenly Father."

"Performative prayer in civil rights activism precipitated a crisis every time," says Shearer. "I often ask my students this question: Because someone uses prayer strategically, does it make prayer less religious?"

Shearer encourages wide-ranging discussions that tackle the nature of religion itself.

"At a Griz game, you see fans wearing special robes and head attire, drinking ritual beverages, eating ritual foods and chanting together. Why isn't that a religion?" he quips.

Religion differs, he says, because it involves focused engagement with a suprahuman force and imagining of an ultimate horizon. While Griz fans may appeal to the divine for the game's outcome, they do not claim that the sport is the ultimate purveyor of meaning.

Shearer believes that a key to achieving a more peaceful and just world lies in understanding how religion and race inform each other.

"Race and religion can be extremely volatile," he says, "but in the civil rights era they came together to bring about change."

Protestors pray on the green in downtown Orangeburg, S.C., in 1963. Pictured are (left to right) the Revs. Herbert Nelson, J.W. Curry and Chappelle Davis, among others. (Photo by Cecil J. Williams)

— By Deborah Richie

MonTEC — continued from page 3

licensing. But what happens from there? The truth is, of course, there's a huge leap between the prototype stage in the academic world and the stage where a product is successful on the market. And, similarly, there's a gap between a solid business plan and the point where a full-fledged company has the financial stability to fly on its own.

Purity Systems Inc. is one tenant company that takes advantage of MonTEC and its laboratory facilities. The company works on polymer technology that removes mercury and other metals from water. In the lab scientists perform analytical work, studying how their product works on a wide range of water samples.

"Some samples might have different pH levels," Fanguy says. "Others might have different types of particulate matter in them. This lab helped the company optimize its commercial processes."

Purity Systems now analyzes mining samples from around the world, but it wasn't long ago that the company was just an idea in UM chemistry Professor Ed Rosenberg's mind.

Moving forward, MonTEC's focus on fostering startup companies linked to UM won't change, but Fanguy says they are exploring new business models to make the facility stronger.

One major change will be using Rivertop Renewables as an anchor tenant (see related story). The company plans to expand and grow, providing MonTEC with a hearty company that will stabilize the incubator and serve as a prime example of the organization's success.

Logistically, once construction is complete Rivertop will occupy the eastern 15,000 square feet of the facility, reducing the number of overall tenants to be incubated. Fanguy says that this will help provide more focus on the individual needs of each company rather than just managing the facility as a real estate venture.

"Our overall goal is to spend a few years helping early stage companies get to a point where they outgrow the need for an incubator and move out on their own creating more jobs for our local community," he says.

When Same Sky Tickets moved in as a MonTEC tenant in 2009, it didn't have an intellectual property contract with UM. It did, however, have the potential to create a relationship with UM students. The company tapped into the computer science department to find interns to help with development. It was a low-cost solution for the startup, but it also has benefited students.

"We've had at least a dozen different interns who have worked for us since that first summer," Same Sky CEO Bob Clay says. "We've had interns that haven't flourished really well – it's a real job, you're given real responsibilities, and we expected them to deliver. But currently three of my programmers who are full time for me now were unpaid interns at one point. It's a good opportunity to learn what it's like to work in a real environment and to work in a technical industry."

Same Sky recently split into two companies. Same Sky Systems is a cloud-computing infrastructure company, which in June took over the system administration for the Rocky Mountain Supercomputing Center in Butte. The other, SkyTics, is a commercial company that does production applications for ticketing solutions specially customized for venues, performing groups, sports groups, fundraising and other events.

Same Sky's growth and successes prompted a move out of MonTEC and into its own place, and MonTEC boasts several other successful graduates over the years, including Rocky Mountain Biologicals, a local vaccine company; Visual Learning Systems, a global information system software corporation; and Sunburst Sensors, which manufactures underwater scientific instruments.

"Do they all work out?" Fanguy says. "Of course not. That's sort of the game of this. If one in 10 does, that's actually a pretty good statistic."

Still, part of UM's new plan is to offer more support opportunities through collaboration with UM's School of Business Administration and the newly formed Missoula Economic Partnership. Fanguy says MonTEC also will pilot an executive-in-residence program in 2012 that will allow experienced entrepreneurs to work hand-in-hand with tenant companies on business-plan development and identifying growth milestones.

The payoff for working hard to bolster these companies has a domino effect. MonTEC can help tenant companies. Tenant companies can help promote UM research, which can, in turn, help promote student learning. In the end, when a company is ready to leave MonTEC it also can benefit the Missoula economy.

"As an institution we're good at research, we're good at education, we're good at service, but we don't run a Fortune 500 company," says Fanguy. "These companies bring a different mindset to the game, and that collaboration helps our overall research efforts as a University – which can translate into economic opportunities for the state of Montana and our country."

— By Erika Fredrickson

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